November 30, 1892.

ANNIVERSARY MEETING.

The LORD KELVIN, D.C.L., LL.D., President, in the Chair.

The Report of the Auditors of the Treasurer's Accounts, on the part of the Society, was presented, by which it appears that the total receipts on the General Account during the past year, including balances carried from the preceding year and £1,300 received from the Meteorological Office for the purchase of Westwood House, amount to £8,180 6*s.* 11*d.*, and that the total receipts on account of Trust Funds, including balances carried from the preceding year, amount to £6,779 11*s.* 4*d.* The total expenditure for the same period, including £1,300 paid for Westwood House, amounts to £7,021 15*s.* 0*d.* on the General Account, and £2,840 19*s.* 1*d.* on account of Trust Funds, leaving a balance on the General Account of £1,125 10*s.* 4*d.* at the bankers', and £33 1*s.* 7*d.* in the hands of the Treasurer, and, on account of Trust Funds, a balance at the bankers' of £3,938 12*s.* 3*d.*

The thanks of the Society were voted to the Treasurer and Auditors.

The Secretary then read the following Lists :—

Fellows deceased since the last Anniversary (Nov. 30, 1891).

Royal.

His Majesty Pedro II, Ex-Emperor of Brazil.

On the Home List.

Adams, John Couch, D.Sc.
Airy, Sir George Biddell, K.C.B.
Aitken, Sir William, M.D.
Bates, Henry Walter, F.L.S.
Bennett, Sir James Risdon, M.D.
Bowman, Sir William, Bart., M.D.
Bramwell, Right Hon. George William Wilsher, Lord, LL.D.
Caird, Right Hon. Sir James, K.C.B.
Calver, Edward Killwick, Capt. R.N.
Clark, Frederick Le Gros, F.R.C.S.
Devonshire, William Cavendish, Duke of, K.G.
Dittmar, William, LL.D.
Grant, Lieut.-Col. James Augustus, C.B.
Grant, Robert, M.A.
Gregory, Right Hon. Sir William Henry, K.C.M.G.
Henry, William Charles, M.D.
Hirst, Thomas Archer, Ph.D.
Hofmann, August Wilhelm von, Ph.D.
Hunt, Thomas Sterry, LL.D.

Knowles, Sir Francis Charles, Bart., M.A.
Paget, Sir George Edward, K.C.B.
Ramsay, Sir Andrew Crombie, LL.D.
Russell, William Henry Leighton, A.B.
Schorlemmer, Carl, LL.D.
Sherbrooke, Robert Lowe, Viscount, G.C.B.
Sutherland, George Granville William Sutherland-Leveson Gower, Duke of, K.G.
Tennyson, Alfred, Lord, D.C.L.
Thomson, James, LL.D.
Wood, John, F.R.C.S.

On the Foreign List.

Kopp, Hermann Franz Moritz.
Kronecker, Leopold.
Quatrefages de Bréau, Jean Louis Armand de.
Stas, Jean Servais.

Change of Name and Title.

Playfair, Sir Lyon, *to* Lord Playfair.
Thomson, Sir William, *to* Lord Kelvin.

Fellows elected since the last Anniversary.

Armstrong, Lieut.-Col. Robert Young, R.E.
Beddard, Frank Evers, M.A.
Devonshire, Spencer Compton Cavendish, Duke of, K.G.
Fleming, Prof. John Ambrose, D.Sc.
Foster, Prof. Clement Le Neve, D.Sc.
Gadow, Hans, M.A., Ph.D.
Giffen, Robert, LL.D.
Gotch, Prof. Francis, M.A., M.R.C.S.
Herdman, Prof. William Abbott, D.Sc.
Herschell, Right Hon. Farrer, Lord, D.C.L.
Hutton, Capt. Frederick Wollaston, F.G.S.
Joly, John, M.A.
Larmor, Joseph, D.Sc.
Miall, Prof. Louis C., F.L.S.
Peach, Benjamin Neve, F.R.S.E.
Pedler, Prof. Alexander, F.I.C.
Waller, Augustus D., M.D.

On the Foreign List.

Kühne, Willy.
Mascart, Éleuthère Élie Nicolas.
Mendeleeff, Dmitri Ivanovitch.
Newton, Hubert Anson.

The President then addressed the Society as follows:—

Since our last Anniversary Meeting, the Royal Society has lost 29 Fellows on the Home List, and 5 Foreign Members, a sadly great number.

Pedro (Dom) II (d'Alcantara), Emperor of Brazil, December 5, 1891.

Ramsay, Sir Andrew Crombie, December 9, 1891, aged 77.
Stas, Jean Servais, December 13, 1891, aged 78.
Bennett, Sir James Risdon, December 14, 1891, aged 82.
Devonshire, William Cavendish, 7th Duke of, December 21, 1891, aged 83.
Russell, William Henry Leighton, December 28, 1891, aged 68.
Kronecker, Leopold, December 29, 1891.
Wood, John, December 29, 1891, aged 66.
Airy, Sir George Biddell, January 2, 1892, aged 90.
Henry, William Charles, January 7, 1892, aged 88.
Quatrefages de Bréau, Jean Louis Armand de, January 12, 1892, aged 81.
Adams, John Couch, January 21, 1892, aged 72.
Paget, Sir George Edward, January 29, 1892, aged 83.
Caird, Right Hon. Sir James, February 9, 1892, aged 76.
Dittmar, William, February 9, 1892, aged 59.
Grant, (Lieut.-Col.) James Augustus, February 11, 1892, aged 65.
Hunt, Thomas Sterry, February 12, 1892, aged 66.
Bates, Henry Walter, February 16, 1892, aged 67.
Hirst, Thomas Archer, February 16, 1892, aged 61.
Kopp, Hermann Franz Moritz, February 20, 1892, aged 75.
Gregory, Right Hon. Sir William Henry, March 6, 1892, aged 75.
Knowles, Sir Francis Charles, Bart., March 19, 1892, aged 90.
Bowman, Sir William, Bart., March 29, 1892, aged 76.
Hofmann, August Wilhelm von, May 5, 1892, aged 74.
Thomson, James, May 8, 1892, aged 71.
Bramwell, George William Wilsher, Lord, May 9, 1892, aged 84.
Aitken, Sir William, June 25, 1892, aged 67.
Schorlemmer, Carl, June 27, 1882, aged 58.
Clark, Frederick Le Gros, July 19, 1892, aged 82.
Sherbrooke, Robert Lowe, Viscount, July 27, 1892, aged 81.
Sutherland, George Granville William Sutherland-Leveson Gower, Duke of, September 22, 1892, aged 64.
Tennyson, Alfred, Lord (Poet Laureate), October 6, 1892, aged 83.
Grant, Professor Robert, October 24, 1892, aged 78.
Calver, (Captain) Edward Killwick, October 28, 1892, aged 79.

Biographical notices will be found in the Proceedings.

The work of continuing the 'Catalogue of Scientific Papers' is being steadily carried on with the resources at the disposal of the Society. The Council and the Catalogue Committee have had under serious consideration the means which should be adopted to make the Catalogue as useful and as complete as possible. The difficulties on financial and other grounds are very great, but the Council is resolved to persevere in this most valuable work.

During the past year, in the mathematical and physical section of the 'Philosophical Transactions,' eighteen papers have been published, and in the biological section, eleven; the two sections together containing a total of 1235 pages of letterpress, and 50 plates. Of the 'Proceedings,' fourteen numbers have been issued, containing 1223 pages, and 20 plates. This unusually large bulk is partly accounted for by the publication in the 'Proceedings' of certain extra matters which the Council deemed likely to interest the Fellows. One part (No. 307), which forms an Appendix to Volume L, contains results of the Revision of the Statutes, to which I alluded in my Anniversary Address last year. It consists of a summary of the Second and Third Charters, and a copy of the Statutes as now revised, followed by an interesting note on the History of the Statutes, which has been drawn up by our Senior Secretary, Professor Michael Foster. In addition to these matters, the same number contains a complete List of the Portraits and Busts at present in the apartments of the Society, compiled by order of the Library Committee, a work which was much needed, as no such list had been made since Weld's Catalogue, printed thirty-two years ago. The new "list" is not a descriptive catalogue, but the names of the painters and donors, and the dates of the gifts, so far as a thorough and somewhat laborious examination of the Council minutes and Journal books has revealed them, are furnished. The List of Portraits is followed by a full descriptive Catalogue of the Medals at present in the possession of the Society, which has been carefully made by our clerk, Mr. James, under the supervision of the Treasurer.

Another extra number of the 'Proceedings' (No. 310) is devoted to a First Report of the Water Research Committee on the Present State of our Knowledge concerning the Bacteriology of Water, by Professors Percy Frankland and Marshall Ward. It contains 96 pages, full of most valuable information regarding the vitality of micro-organisms in drinking water, to which in a large measure the spread of Asiatic cholera, typhoid fever, and other zymotic diseases is now known to be due.

In my Presidential Address of last year, I referred to this Water Committee as having been appointed by the Royal Society, in alliance with the London County Council; and this first instalment of its work seems amply to justify its originators in their expectations of results, most valuable for the public health, from the investigation which has been commenced.

A third extra number (No. 311) contains the Report of the Committee on Colour Vision. This Committee, from the time of its appointment in March, 1880, held over thirty meetings, in course of which it examined more than 500 persons as to their colour vision, and tried various methods and many kinds of apparatus for colour

testing. The report of the results of the whole inquiry contains a large mass of most interesting matter, and the Committee's work ends in a set of practical recommendations, from which we may hope that much benefit will come, in the prevention of inconvenience and disaster liable to be produced by mistake of colour signals, both at sea and on railways.

Mr. Ellis's communication* to the Royal Society of last May, and Professor Grylls Adams' communication† of June, 1891, both on the subject of simultaneous magnetic disturbances found by observations at magnetic observatories in different parts of the world; the award of a Royal medal two years ago to Hertz, for his splendid experimental work on electro-magnetic waves and vibrations; and Professor Schuster's communication‡ to the Royal Society, of June, 1889, on the "Diurnal Variations of Terrestrial Magnetism;" justify me in saying a few words on the present occasion regarding terrestrial magnetic storms, and the hypothesis that they are due to magnetic waves emanating from the sun.

Guided by Maxwell's "electro-magnetic theory of light," and the undulatory theory of propagation of magnetic force which it includes, we might hope to perfectly overcome a fifty years outstanding difficulty in the way of believing the sun to be the direct cause of magnetic storms in the earth, though hitherto every effort in this direction has been disappointing. This difficulty is clearly stated by Professor W. G. Adams, in the following sentences, which I quote from his Report to the British Association of 1881 (p. 469), "On Magnetic Disturbances and Earth Currents":—"Thus we see that the magnetic changes which take place at various points of the earth's surface at the same instant are so large as to be quite comparable with the earth's total magnetic force; and in order that any cause may be a true and sufficient one, it must be capable of producing these changes rapidly."

The primary difficulty, in fact, is to imagine the sun a variable magnet or electro-magnet, powerful enough to produce at the earth's distance changes of magnetic force amounting, in extreme cases, to as much as 1/20 or 1/30, and frequently, in ordinary magnetic storms, to as much as 1/400 of the undisturbed terrestrial magnetic force.

The earth's distance from the sun is 228 times the sun's radius, and the cube of this number is about 12,000,000. Hence, if the sun were, as Gilbert found the earth to be, a globular magnet, and if it were of the same average intensity of magnetisation as the earth, we see, according to the known law of magnetic force at a distance, that the magnetic force due to the sun at the earth's distance from it, in

* 'Roy. Soc. Proc.,' November, 1822, vol. 52, p. 191.
† 'Phil. Trans.,' vol. 183, 1891–92, p. 131.
‡ 'Phil. Trans.,' vol. 180, 1889, p. 467.

any direction, would be only a twelve-millionth of the actual force of terrestrial magnetisation at any point of the earth's surface in a corresponding position relatively to the magnetic axis. Hence the sun must be a magnet* of not much short of 12,000 times the average intensity of the terrestrial magnet (a not absolutely inconceivable supposition, as we shall presently see) to produce, by direct action simply as a magnet, any disturbance of terrestrial magnetic force sensible to the instruments of our magnetic observatories.

Considering probabilities and possibilities as to the history of the earth from its beginning to the present time, I find it unimaginable but that terrestrial magnetism is due to the greatness and the rotation of the earth. If it is true that terrestrial magnetism is a necessary consequence of the magnitude and the rotation of the earth, other bodies comparable in these qualities with the earth, and comparable also with the earth in respect to material and temperature, such as Venus and Mars, must be magnets comparable in strength with the terrestrial magnet, and they must have poles similar to the earth's north and south poles on the north and south sides of their equators, because their directions of rotation, as seen from the north side of the ecliptic, are the same as that of the earth. It seems probable, also, that the sun, because of its great mass and its rotation in the same direction as the earth's rotation, is a magnet with polarities on the north and south sides of its equator, similar to the terrestrial northern and southern magnetic polarities. As the sun's equatorial surface-velocity is nearly four and a half times the earth's, it seems probable that the average solar magnetic moment exceeds the terrestrial considerably more than according to the proportion of bulk. Absolutely ignorant as we are regarding the effect of cold solid rotating bodies such as the earth, or Mars, or Venus, or of hot fluid rotating bodies such as the sun, in straining the circumambient ether, we cannot say that the sun might not be 1000, or 10,000, or 100,000 times as intense a magnet as the earth. It is, therefore, a perfectly proper object for investigation to find whether there is, or is not, any disturbance of terrestrial magnetism, such as might be produced by a constant magnet in the sun's place with its magnetic axis coincident with the sun's axis of rotation. Neglecting for the present the seven degrees of obliquity of the sun's equator, and supposing the axis to be exactly perpendicular to the ecliptic, we have an exceedingly simple case of magnetic action to be considered: a magnetic force perpendicular to the ecliptic at every part of the earth's orbit and varying

* The moon's apparent diameter being always nearly the same as the sun's, the statements of the last four sentences are applicable to the moon as well as to the sun, and are important in connection with speculation as to the cause of the lunar disturbance of terrestrial magnetism, discovered nearly fifty years ago by Kreil and Sabine.

inversely as the cube of the earth's distance from the sun. The components of this force parallel and perpendicular to the earth's axis are, respectively, 0·92 and 0·4 of the whole; of which the former could only be perceived in virtue of the varying distance of the earth from the sun in the course of a year; while the latter would give rise to a daily variation, the same as would be observed if the red ends of terrestrial magnetic needles were attracted towards an ideal star of declination 0° and right ascension 270°. Hence, to discover the disturbances of terrestrial magnetism, if any there are, which are due to direct action of the sun as a magnet, the photographic curves of the three magnetic elements given by each observatory should be analysed for the simple harmonic constituent of annual period and the simple harmonic constituent of period equal to the sidereal day. We thus have two very simple problems, each of which may be treated with great ease separately by a much simplified application of the principles on which Schuster has treated his much more complex subject, according to Gauss' theory as to the external or internal origin of the disturbance, and Professor Horace Lamb's investigation of electric currents induced in the interior of a globe by a varying external magnet. The sidereal diurnal constituent which forms the subject of the second of these simplified problems is smaller, but not much smaller, than the solar diurnal term which, with the solar semi-diurnal, the solar ter-diurnal, and solar quarter-diurnal constituents, form the subjects of Schuster's paper. The conclusion at which he has arrived, that the source of the disturbance is external, is surely an ample reward for the great labour he has bestowed on the investigation hitherto; and I hope he may be induced to undertake the comparatively slight extension of his work which will be required for the separate treatment of the two problems of the sidereal diurnal and the solar annual constituents, and to answer for each the question:—Is the source external or internal?

But even though external be the answer found in each case, we must not from this alone assume that the cause is direct action of the sun as a magnet. The largeness of the solar semi-diurnal, ter-diurnal, and quarter-diurnal constituents found by the harmonic analysis, none of which could be explained by the direct action of the sun as a magnet, demonstrate relatively large action of some other external influence, possibly the electric currents in our atmosphere, which Schuster suggested as a probable cause. The cause, whatever it may be, for the semidiurnal and higher constituents would also probably have a variation in the solar diurnal period on account of the difference of temperature of night and day, and a sidereal and annual period on account of the difference of temperature between winter and summer.

Even if, what does not seem very probable, we are to be led by the

analysis to believe that magnetic force of the sun is directly perceptible here on the earth, we are quite certain that this steady force is vastly less in amount than the abruptly varying force which, from the time of my ancestor in the Presidential Chair, Sir Edward Sabine's, discovery,* forty years ago, of an apparent connexion between sun-spots and terrestrial magnetic storms, we have been almost compelled to attribute to disturbing action of some kind at the sun's surface.

As one of the first evidences of this belief, I may quote the following remarkable sentences from Lord Armstrong's Presidential Address to the British Association at Newcastle, in 1863 :—

"The sympathy also which appears to exist between forces operating in the sun and magnetic forces belonging to the earth merits a continuance of that close attention which it has already received from the British Association, and of labours such as General Sabine has, with so much ability and effect, devoted to the elucidation of the subject. I may here notice that most remarkable phenomenon which was seen by independent observers at two different places, on the 1st of September, 1859. A sudden outburst of light, far exceeding the brightness of the sun's surface, was seen to take place, and sweep like a drifting cloud over a portion of the solar face. This was attended with magnetic disturbances of unusual intensity, and with exhibitions of aurora of extraordinary brilliancy. The identical instant at which the effusion of light was observed was recorded by an abrupt and strongly marked deflection in the self-registering instruments at Kew. The phenomenon as seen was probably only part of what actually took place, for the magnetic storm in the midst of which it occurred commenced before, and continued after, the event. If conjecture be allowable in such a case, we may suppose that this remarkable event had some connexion with the means by which the sun's heat is renovated. It is a reasonable supposition that the sun was at that time in the act of receiving a more than usual accession of new energy; and the theory which assigns the maintenance of its power to cosmical matter, plunging into it with that prodigious velocity which gravitation would impress upon it as it approached to actual contact with the solar orb, would afford an explanation of this sudden exhibition of intensified light, in harmony with the knowledge we have now attained, that arrested motion is represented by equivalent heat."

It has certainly been a very tempting hypothesis, that quantities of meteoric matter suddenly falling into the sun is the cause, or one of the causes, of those disturbances to which magnetic storms on the earth are due. We may, indeed, knowing that meteorites do fall into the earth, assume without doubt that much more of them fall, in

* Communication to the Royal Society, March 18, 1852 ('Phil. Trans.,' vol. 162, p. 143).

the same time, into the sun. Astronomical reasons, however, led me long ago to conclude that their quantity annually, or per century, or per thousand years, is much too small to supply the energy given out by the sun in heat and light radiated through space, and led me to adopt unqualifiedly Helmholtz's theory, that work done by gravitation on the shrinking mass is the true source of the sun's heat, as given out at present, and has been so for several hundred thousand years, or several million years. It is just possible, however, that the outburst of brightness described by Lord Armstrong may have been due to an extraordinarily great and sudden falling in of meteoric matter, whether direct from extra-planetary space, or from orbital circulation round the sun. But it seems to me much more probable that it was due to a refreshed brightness produced over a larger area of the surface than usual by brilliantly incandescent fluid rushing up from below, to take the place of matter falling down from the surface, in consequence of being cooled in the regular *régime* of solar radiation. It seems, indeed, very improbable that meteors fall in at any time to the sun in sufficient quantity to produce dynamical disturbances at his surface at all comparable with the gigantic storms actually produced by hot fluid rushing up from below, and spreading out over the sun's surface.

But now let us consider for a moment the work which must be done at the sun to produce a terrestrial magnetic storm. Take, for example, the magnetic storm of June 25, 1885, of which Adams gives particulars in his paper of June, 1891 ('Phil. Trans.,' p. 139 and Pl. 9). We find at eleven places, St. Petersburg, Stonyhurst, Wilhelmshaven, Utrecht, Kew, Vienna, Lisbon, San Fernando, Colaba, Batavia, and Melbourne, the horizontal force increased largely from 2 to 2.10 P.M., and fell at all the places from 2.10 to 3 P.M., with some rough ups and downs in the interval. The storm lasted altogether from about noon to 8 P.M. At St. Petersburg, Stonyhurst, and Wilhelmshaven, the horizontal force was above par by 0·00075, 0·00088, and 0·00090 (C.G.S. in each case) at 2.10 P.M.; and below par by 0·0007, 0·00066, 0·00075 at 3 o'clock. The mean value for all the eleven places was nearly 0·0005 above par at 2h. 10m., and 0·0005 below par at 3h. The photographic curves show changes of somewhat similar amounts following one another very irregularly, but with perfectly simultaneous correspondence at the eleven different stations, through the whole eight hours of the storm. To produce such changes as these by any possible dynamical action within the sun, or in his atmosphere, the agent must have worked at something like 160 million million million million horse-power* (12×10^{35} ergs per sec.), which is about 364 times the total horse-power ($3{\cdot}3 \times 10^{33}$ ergs per sec.) of the solar radiation. Thus, in this eight hours of a

* 1 horse power = $7{\cdot}46 \times 10^9$ ergs per second.

not very severe magnetic storm, as much work must have been done by the sun in sending magnetic waves out in all directions through space as he actually does in four months of his regular heat and light. This result, it seems to me, is absolutely conclusive against the supposition that terrestrial magnetic storms are due to magnetic action of the sun; or to any kind of dynamical action taking place within the sun, or in connexion with hurricanes in his atmosphere, or anywhere near the sun outside.

It seems as if we may also be forced to conclude that the supposed connexion between magnetic storms and sun-spots is unreal, and that the seeming agreement between the periods has been a mere coincidence.

We are certainly far from having any reasonable explanation of any of the magnetic phenomena of the earth; whether the fact that the earth is a magnet; that its magnetism changes vastly, as it does from century to century; that it has somewhat regular and periodic annual, solar diurnal, lunar diurnal, and sidereal diurnal variations; and (as marvellous as the secular variation) that it is subject to magnetic storms. The more marvellous, and, for the present inexplicable, all these subjects are, the more exciting becomes the pursuit of investigations which must, sooner or later, reward those who persevere in the work. We have at present two good and sure connexions between magnetic storms and other phenomena: the aurora above, and the earth currents below, are certainly in full working sympathy with magnetic storms. In this respect the latter part of Mr. Ellis's paper is of special interest, and it is to be hoped that the Greenwich observations of earth currents will be brought thoroughly into relation with the theory of Schuster and Lamb, extended, as indeed Professor Schuster promised to extend it, to include not merely the periodic diurnal variations, but the irregular sudden changes of magnetic force taking place within any short time of a magnetic storm.

In my Presidential Address of last year I referred to the action of the International Geodetic Union, on the motion of Professor Foerster, of Berlin, to send an astronomical expedition to Honolulu for the purpose of making a twelve months' series of observations on latitude, corresponding to twelve months' simultaneous observations to be made in European observatories; and I was enabled, through the kindness of Professor Foerster, to announce as a preliminary result, derived from the first three months of the observations, that the latitude had increased during that time by $\frac{1}{3}$ sec. at Berlin, and had decreased at Honolulu by almost exactly the same amount. The proposed year's observations, begun in Honolulu on the 1st of June, 1891, were completed by Dr. Marcuse, and an elaborate reduction of them by the permanent Committee of the International Geodetic Union was published a month ago at Berlin. The results are in

splendid agreement with those of the European observatories: Berlin, Prag, and Strasbourg. They prove beyond all question that between May, 1891, and June, 1892, the latitude of each of the three European observatories was a maximum, and of Honolulu a minimum, in the beginning of October, 1891: that the latitude of the European observatories was a minimum, and of Honolulu a maximum, near the beginning of May, 1892: and that the variations during the year followed somewhat approximately, simple harmonic law as if for a period of 385 days, with range of about $\frac{1}{4}$ sec. above and below the mean latitude in each case. This is just what would result from motion of the north and south polar ends of the earth's instantaneous axis of rotation, in circles on the earth's surface of 7·5 metres radius, at the rate of once round in 385 days.

Sometime previously it had been found by Mr. S. C. Chandler that the irregular variations of latitude which had been discovered in different observatories during the last 15 years seemed to follow a period of about 427 days, instead of the 306 days given by Peters' and Maxwell's dynamical theory, on the supposition of the earth being wholly a rigid body. And now, the German observations, although not giving so long a period as Chandler's, quite confirm the result that, whatever approximation to following a period there is, in the variations of latitude, it is a period largely exceeding the old estimate of 306 days.

Newcomb, in a letter which I received from him last December, gave, what seems to me to be, undoubtedly, the true explanation of this apparent discrepance from dynamical theory, attributing it to elastic yielding of the earth as a whole. He added a suggestion, specially interesting to myself, that investigation of periodic variations of latitude may prove to be the best means of determining approximately the rigidity of the earth. As it is, we have now, for the first time, what seems to be a quite decisive demonstration of elastic yielding in the earth as a whole, under the influence of a deforming force, whether of centrifugal force round a varying axis, as in the present case, or of tide-generating influences of the sun and moon with reference to which I first raised the question of elastic yielding of the earth's material many years ago.

The present year's great advance in geological dynamics forms the subject of a contribution by Newcomb to the 'Monthly Notices of the Royal Astronomical Society,' of last March. In a later paper, published in the 'Astronomische Nachrichten,' he examines records of many observatories, both of Europe and America, from 1865 to the present time, and finds decisive evidence that from 1865 to 1890 the variations of latitude were much less than they have been during the past year, and seeming to show that an augmentation took place, somewhat suddenly, about the year 1890.

When we consider how much water falls on Europe and Asia during a month or two of rainy season, and how many weeks or months must pass before it gets to the sea, and where it has been in the interval, and what has become of the air from which it fell, we need not wonder that the distance of the earth's axis of equilibrium of centrifugal force from the instantaneous axis of rotation should often vary* by 5 or 10 metres in the course of a few weeks or months. We can scarcely expect, indeed, that the variation found by the International Geodetic Union during the year beginning June, 1891, should recur periodically for even as much as one or two or three times of the seeming period of 385 days.

One of the most important scientific events of the past year has been Barnard's discovery, on the 9th of September, of a new satellite to Jupiter. On account of the extreme faintness of the object, it has not been observed anywhere except at the Lick Observatory in California. There, at an elevation of 4500 ft., with an atmosphere of great purity, and with a superb refractor of 36″ aperture, they have advantages not obtainable elsewhere. The new satellite is about 112,000 miles distant from Jupiter, and its periodic time is about 11 h. 50 m. Mr. Barnard concludes a short statement of his discovery with the following sentences:—"It will thus be seen that this new satellite makes two revolutions in one day, and that its periodic time about the planet is less than two hours longer than the axial rotation of Jupiter. Excepting the inner satellite of Mars, it is the most rapidly revolving satellite known. When sufficient observations have been obtained, it will afford a new and independent determination of the mass of Jupiter. Of course, from what I have said in reference to the difficulty of seeing the new satellite, it will be apparent that the most powerful telescopes of the world only will show it" (dated Mount Hamilton, September 21, 1892).

Sir Robert Ball, in calling my attention to it, remarks that "it is by far the most striking addition to the solar system since the discovery of the satellites to Mars in 1877." To all of us it is most interesting that during this year, when we are all sympathising with the University of Padua in its celebration of the third centenary of its acquisition of Galileo as a Professor, we have first gained the knowledge of a fifth satellite in addition to the four discovered by Galileo.

The President then presented the Medals awarded by the Society as follows:—

* See 'Brit. Assoc. Reports,' 1876, Address to Section A, pp. 10, 11.

Copley Medal.

Rudolph Virchow.

Professor Virchow's eminent services to science are known throughout the world, and they are far too varied and numerous for enumeration.

He survives Schwann, Henle, and the other pioneers in several branches of natural history who came from the school of Johannes Müller, and at the present time occupies a position of influence and honour equal to that of his great contemporaries Helmholtz, Ludwig, and Du Bois-Reymond.

His contributions to the study of morbid anatomy have thrown light upon the diseases of every part of the body,* but the broad and philosophical view he has taken of the processes of pathology has done more than his most brilliant observations to make the science of disease.

In histology he has the chief merit of the classification into epithelial organs, connective tissues, and the higher and more specialised muscle and nerve. He also demonstrated the presence of neuroglia in the brain and spinal cord, and discovered crystalline hæmatoidine, and the true structure of the umbilical cord.

In pathology, strictly so called, his two great achievements—the detection of the cellular activity which lies at the bottom of all morbid as well as normal physiological processes, and the classification of the important group of new growths on a natural histological basis—have each of them not only made an epoch in medicine, but have been the occasion of fresh extension of science by other labourers.

In ethnological and archæological science Professor Virchow has made observations which only the greatness of his other work has thrown into the shade; and, so far from confining himself to technical labours, he has been known since he migrated to Würzburg and returned to Berlin as a public-spirited, far-seeing, and enlightened politician.†

Universally honoured and personally esteemed by most of the leading pathologists in this country, as well as on the Continent and in America, who had the good fortune to be his pupils, Professor Virchow is a worthy successor of the many illustrious men of science to whom the Copley Medal has been awarded.

* Among these may be mentioned his discovery of leucæmia, of lardaceous degeneration, and glioma; his reconstruction of the kind of tumour known as sarcoma, and his establishment of the important group of granulomata.

† A short pamphlet, "Ueber die Nationale Bedeutung der Naturwissenschaften," may be mentioned as characteristic of the patriotism, the fairness, and the broad judgment of the author.

RUMFORD MEDAL.

Nils C. Dunér, Director of the Observatory of Lund.

Dr. Dunér has been continuously at work, since 1871, at astronomical observations (see 'R.S. Catalogue').

He began to turn his attention to spectroscopic subjects in 1878, and commenced the publication of his systematic work on Stellar Spectra in 1882.

In 1884 he brought to a conclusion his wonderful observations of stars of Vogel's III Class. His memoir contains a detailed study of the spectra of nearly 400 stars, all which are the most difficult objects to observe. This volume is one of the foundations on which any future work in this direction must be based.

In 1891 he published another series of researches on the rotation of the sun, comparing true solar with telluric lines for regions up to 75° of solar latitude. The result showed a diminution of angular velocity with increasing latitude, thus spectroscopically confirming Carrington's results.

ROYAL MEDAL.

Professor Charles Pritchard, D.D., F.R.S., Director of the Oxford University Observatory.

Professor Pritchard began his publications on astronomical subjects in 1852. His first paper and several others which have followed, have dealt with the construction of object glasses and telescope adjustments.

He was President of the Royal Astronomical Society in the years 1867 and 1868.

He was appointed first Director of the newly-founded observatory at Oxford in 1874. It is now the most active University observatory in the kingdom, as many as fifteen students receiving instruction in observatory work at times. The services he has rendered to astronomy in devising, and keeping at a high standard, the work of the observatory in many directions, including its use as a school, are very noteworthy.

Immediately on the establishment of the observatory he saw the beneficial effects of photographic investigation, and first applied the method, with the old wet-plate photography, to the problem of the physical libration of the moon. He saw that this problem was encumbered in heliometric work by the fact that a set of the observations must take a considerable time, and therefore they were made on a constantly changing disc, necessitating great labour in reduction. By the observations being made in two or three seconds, the picture of the moon did not alter in the time. The result was to

show important variations from Bouvard's work, which variations in their important particulars were confirmed by Dr. Hartwig.

Next (1885) the relative motions of the Pleiades were taken up with a view of tracing gravitational effects in the various members of the group. This question is not ripe for solving, but it induced heliometer observers to take up the question, and important progress is now being made.

The photometric work detailed in the 'Uranometria Nova Oxoniensis,' also published in 1885, consisted in measuring the light received from all stars visible to the naked eye, to 10° south declination, by means of a wedge photometer devised by Professor Pritchard—a form of photometer now in the hands of many astronomers. In the course of this work Professor Pritchard, at his own expense, took an assistant to Egypt to determine the effects of atmospheric absorption in a more constant climate than that of Oxford. This photometric work has been recognised by the award of the Gold Medal of the Royal Astronomical Society.

Having fully determined the capacity of photography for accurate measurement, Professor Pritchard next applied it to parallax determinations of stars of the second magnitude. Some thirty stars altogether have been investigated, and this work is now in the press. Thirty is a greater number than any other astronomer has attempted.

Professor Pritchard is now working on the International Chart of the Heavens, and taking part in researches to ensure an accurate photometric scale.

Royal Medal.

John Newport Langley, F.R.S.

Some of the most important of Mr. Langley's researches have been upon the Physiology and Histology of Secreting Glands. Extending the observations of Kühne and Lea on the pancreas, Mr. Langley showed in an elaborate series of researches, extending over the salivary and most of the important secreting glands of the body, that the formation, as a morphological element within the secreting cell, at the expense of its protoplasm, of the material to be used in the secretion is a general function of secreting cells. The dependence of this function upon the activity of nerves, and upon other forms of excitation, such as the action of drugs, has been greatly elucidated in the course of these researches. Concurrently with the morphological changes within the cells, the chemical changes which occur within the secretion as the result of nerve activity or inactivity have been investigated, and many important facts brought to light regarding the nature of the action or modifications of the action which may be brought to bear upon the secreting cell through the nervous system.

These researches are published partly in the 'Philosophical Transactions,' and partly in a long series of articles in the 'Journal of Physiology,' which have extended over several years. It is not too much to say that these researches of Mr. Langley upon secreting glands give him a claim to occupy the highest rank as a physiological investigator.

The other most important researches which Mr. Langley has published have been—(1.) Upon the central nervous system, including especially an investigation into the anatomical changes which result from central lesions; (2.) Upon the sympathetic nervous system, and particularly a number of researches, based upon physiological methods, into its peripheral distribution to involuntary muscle and glands. Mr. Langley's eminence in those branches of physiology to which he has mainly devoted his attention is universally admitted, and has been publicly recognised by his having been requested more than once by international assemblies of physiologists to investigate and report on difficult cases submitted to them (*vide* 'Transactions of the International Medical Congress,' 1881, and 'Proceedings of the Physiological Congress at Basel,' 1890).

Davy Medal.

François Marie Raoult, of Grenoble, Correspondent of the Academy of Sciences.

The accounts of Professor Raoult's researches on the freezing points of solutions, and on the vapour pressures of solutions, form a long series of papers which have appeared from time to time in the 'Comptes Rendus' and 'Annales de Chimie,' from 1871 down to the present time. Our previous knowledge of these subjects was only fragmentary and disjointed, but he has placed it on a new footing, and established general laws relating to the depression of the freezing points and lowering of the vapour pressures of liquids holding other substances in solution. These laws are of great importance, both to chemistry and physics. Their validity is not disputed, and, while theories of solution are much discussed, it is acknowledged that no theory can stand which does not satisfy the conditions which Raoult, by an induction from a very large number of observations on a great variety of substances, has shown to be the order of nature.

Darwin Medal.

Sir Joseph Dalton Hooker, F.R.S.

Although the regulations relating to the award of this medal direct that it is to be treated rather as a means of encouraging young naturalists to fresh exertion than as a reward for the life-long labours

of the veteran, there would seem to be a special appropriateness in awarding it to one who was intimately associated with Mr. Darwin in the preparation of the 'Origin of Species.' That no one was more closely associated than Sir J. D. Hooker with Mr. Darwin in the work is abundantly proved by the following passage in the introduction to the 'Origin of Species':—"I cannot, however, let this opportunity pass without expressing my deep obligations to Dr. Hooker, who, for the last fifteen years (1844–59), has aided me in every possible way by his large stores of knowledge and his excellent judgment."

The Statutes relating to the election of Council and Officers were then read, and Sir Erasmus Ommanney and Mr. Symons, having been, with the consent of the Society, nominated Scrutators, the votes of the Fellows present were taken, and the following were declared duly elected as Council and Officers for the ensuing year:—

President.—The Lord Kelvin, D.C.L., LL.D.

Treasurer.—Sir John Evans, K.C.B., D.C.L., LL.D.

Secretaries.—Professor Michael Foster, M.A., M.D.; The Lord Rayleigh, M.A., D.C.L.

Foreign Secretary.—Sir Archibald Geikie, LL.D.

Other Members of the Council.

Captain William de Wiveleslie Abney, C.B.; Sir Benjamin Baker, K.C.M.G., LL.D.; Professor Isaac Bayley Balfour, M.A.; William Thomas Blanford, F.G.S.; Professor George Carey Foster, B.A.; Richard Tetley Glazebrook, M.A.; Frederick Ducane Godman, F.L.S.; John Hopkinson, D.Sc.; Professor Joseph Norman Lockyer, F.R.A.S.; Professor John Gray McKendrick, M.D.; William Davidson Niven, M.A.; William Henry Perkin, LL.D.; Rev. Professor B. Price, D.D.; the Marquis of Salisbury, K.G., M.A.; Adam Sedgwick, M.A.; Professor William Augustus Tilden, D.Sc.

The thanks of the Society were given to the Scrutators.

Balance Sheet. 1892.

Statement of Receipts and Expenditure from November 12th, 1891, *to November* 12th, 1892.

	£	s.	d.	£	s.	d.
To Balance at Bank, 12th November, 1891				1,022	5	8
,, Balance in hand, Catalogue Account	4	14	1			
,, ,, Petty Cash	14	17	9	19	11	10
,, Compositions				240	0	0
,, Admission Fees				20	0	0
,, Annual Contributions, at £4	£532	0	0			
,, at £3	504	0	0	1,036	0	0
,, Fee Reduction Fund, in lieu of Admission Fees and Annual Contributions				320	0	0
,, Rents:	£	s.	d.			
Fee Farm, Lewes	18	14	5			
Mablethorpe Estate	97	10	0	116	4	5
,, Ground Rents				604	10	6
,, Dividends (exclusive of Trust Funds)				2,018	2	5
,, Interest on Mortgage Loan (Duke of Norfolk)				109	4	0
,, Sale of Transactions and Proceedings				698	4	11
,, Sale of Catalogue				34	15	11
,, Sale of Krakatoa Report (leaving £72 5*s.* 2*d.* Expenditure in excess of Receipts)				19	7	1
,, Transfer from Handley Fund on account of Catalogue				187	2	4
,, Sale of Lendenfeld Monograph (leaving £664 19*s.* 1*d.* expenditure in excess of receipts)				13	7	8
,, Interest on Bank Deposit Account				71	10	2
,, Meteorological Office, for purchase of Westwood House				1,300	0	0
,, Water Research Grants (leaving £150 further now due from London County Council)				350	0	0
				£8,180	6	11

	£	s.	d.	£	s.	d.
By Salaries, Wages, and Pension				1,650	3	10
,, Catalogue of Scientific Papers				387	4	0
,, Books for the Library				218	15	10
,, Printing and Advertising Transactions, and Separate Copies to Authors and Publisher	291	9	8			
,, Ditto Proceedings, Nos. 303 to 315	570	16	9			
,, Ditto Miscellaneous	111	17	9			
,, Paper for Transactions and Proceedings	384	16	3			
,, Binding ditto	45	6	2			
,, Engraving and Lithography	780	0	3	2,184	6	10
,, Soirée and Anniversary Expenses				174	16	7
,, Coal, Lighting, &c.	221	9	9			
,, Office Expenses	67	13	3			
,, House Expenses	183	17	11			
,, Tea Expenses	15	3	11			
,, Fire Insurance	55	5	0			
,, Taxes	45	12	6			
,, Advertising Meetings	18	13	6			
,, Postage, Parcels, and Petty Charges	28	10	5			
,, Miscellaneous Expenses	13	13	10	650	0	1
,, Law Charges				41	7	10
,, Carrington Donation				30	0	0
,, Westwood House, Purchase				1,300	0	0
,, Water Research, Payments				385	0	0
,, Balance at Bankers				1,125	10	4
Including £500 "Challenger" Account and £200 Catalogue Account.						
,, Balance on hand, Catalogue Account	19	4	1			
,, Ditto, Petty Cash	13	17	6	33	1	7
				£8,180	6	11

Trust Funds.

	£	s.	d.	£	s.	d.
To Balance at Bank 12th November, 1891:—						
General Account	1,897	4	6			
Fee Reduction Fund Account	204	15	1			
Scientific Relief Fund Account	1,450	11	5	3,756	2	11
Joule Memorial Fund Account	203	11	11			
„ Scientific Relief Fund, Dividends, and Donations	657	12	11			
„ Donation Fund, Dividends, and Transfer from Jodrell Fund	389	11	6			
„ Rumford Fund, Dividends	62	9	8			
„ Bakerian and Copley Medal Fund, Dividends, &c.	54	10	0			
„ Keck Bequest, Dividends	23	8	0			
„ Wintringham Fund, Dividends, &c.	32	4	0			
„ Davy Medal Fund, Dividends, &c.	32	3	6	3,023	8	5
„ Gassiot Trust, Dividends and Bonds drawn	850	6	3			
„ Handley Fund, Dividends	187	2	4			
„ Jodrell Fund, Dividends	138	19	4			
„ Fee Reduction Fund, Dividends	423	3	0			
„ Darwin Memorial Fund, Dividends	85	16	0			
„ Joule Memorial Fund, Dividends	42	12	2			
„ Brady Library Account, Interest	3	9	9			
„ Gunning Fund, Interest	40	0	0			
				£6,779	11	4

	£	s.	d.	£	s.	d.
By Scientific Relief Fund, Grants	575	0	0			
„ Donation Fund, Grants	519	13	4			
„ Bakerian and Copley Medal Fund, Medal, and Lecture	8	12	0			
„ Keck Bequest, Payment to Foreign Secretary	23	8	0			
„ Wintringham Fund, Payment to Foundling Hospital	32	4	0			
„ Davy Medal Fund, Gold Medals	32	8	9			
„ Gassiot Trust, Payments to Kew Committee and Investment	822	8	0	2,840	19	1
„ Handley Fund, Transfer to General Account, for Catalogue	187	2	4			
„ Jodrell Fund, Transfer to Donation Fund	138	19	4			
„ Fee Reduction Fund, Transfer to Royal Society General Account	320	0	0			
„ Joule Memorial Fund, Tablet and Abbey Fees	181	3	4			
„ Balance at Bankers:—						
General Account	2,032	9	1			
Fee Reduction Fund Account	307	18	1	3,938	12	3
Scientific Relief Fund Account	1,533	4	4			
Joule Memorial Fund Account	65	0	9			
				£6,779	11	4

Estates and Property of the Royal Society, including Trust Funds.

Estate at Mablethorpe, Lincolnshire (55A. 2R. 2P.), rent £85 per annum.

Ground Rent of House, No. 57, Basinghall Street, rent £380 per annum.

„ „ of 23 houses in Wharton Road, West Kensington, rents £253 per annum.

Fee Farm Rent, near Lewes, Sussex, £19 4*s.* per annum.

One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, about £52 per annum, Croonian Lecture Fund.

Stevenson Bequest. Chancery Dividend. One-fourth annual interest on Bank Stock and other Securities (produced £609 15*s.* 11*d.* in 1890-91).

The Funds in Court standing to the credit of the cause were formerly:—

£11,000 Bank Stock.

£11,031 London and North Western Railway Consolidated 4 per Cent. Guaranteed Stock.

£11,105 Great Northern Railway 4 per Cent. Perpetual Preference Stock.

£11,031 North Eastern Railway Consolidated 4 per Cent. Guaranteed Stock.

£8,894 Great Western Railway 5 per Cent. Consolidated Guaranteed Stock.

£11,035 16*s.* 5*d.* Midland Railway 4 per Cent. Preference Stock.

Subject to certain charges, the Royal Society was entitled to one-fourth of the proceeds.

There has now been paid out of Court to the Society:—

£2,128 9*s.* 7*d.* Bank Stock.

£2,758 London and North Western Railway Consolidated 4 per Cent. Guaranteed Stock.

£2,725 Great Northern Railway 4 per Cent. Perpetual Preference Stock.

£2,760 North Eastern Railway Consolidated 4 per Cent. Guaranteed Stock.

£370 3*s.* 7*d.* Midland Railway 4 per Cent. Perpetual Guaranteed Preference Stock.

£3,200 Mortgage Loan, 3½ per Cent., to the Duke of Norfolk.

£19,482 8*s.* 8*d.*, 2¾ per Cent. Consolidated Stock, being £10,779 8*s.* 2*d.* on account of the following Funds:—

	£	*s.*	*d.*
Rumford Fund	2,330	0	0
Wintringham Fund	1,200	0	0
Gassiot Trust	400	0	0
Sir J. Copley Fund	1,666	13	4
Jodrell Fund	5,182	14	10

£5,185 0*s.* 3*d.* General Purposes.

and £3,518 0*s.* 3*d.* in Chancery, arising from sale of the Coleman Street Estate.—General Purposes.

£403 9*s.* 8*d.* New 2½ per Cent. Stock.—Bakerian and Copley Medal Fund.

£3,000 India 3½ per Cent. Stock.—General Purposes.

£800 Midland Railway 3 per Cent. Debenture Stock.—Keck Bequest.

£5,660 Madras Railway Guaranteed 5 per Cent. Stock { General Purposes, £5,000. / Davy Medal Fund, £660.

£10,000 Italian Irrigation Bonds.—The Gassiot Trust.

£8,528 Great Northern Railway 3 per Cent. Debenture Stock { Scientific Relief Fund, £6,666 13*s.* 4*d.* / The Trevelyan Bequest, £1,861 6*s.* 8*d.*

£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.—Donation Fund.

£4,400 Metropolitan 3½ per Cent. Stock.—Fee Reduction Fund.

£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.—Fee Reduction Fund.

£18,150 „ „ „ „ 4 per Cent. Consolidated Guaranteed Stock.— { £6,000 Scientific Relief Fund. / £12,150 General Purposes.

£5,000 „ „ „ „ Consolidated 4 per Cent. Preference Stock.—General Purposes.

£5,000 North Eastern Railway 4 per Cent. Preference Stock.—General Purposes.

£2,200 South Eastern Railway 4 per Cent. Debenture Stock.—Darwin Memorial Fund.

£4,340 South Eastern Railway 5 per Cent. Debenture Stock.—Scientific Relief Fund.

£3,333 London and South Western Railway 4 per Cent. Preference Stock.—General Purposes.

£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.—Handley Fund.

£800 London, Brighton, and South Coast Railway Consolidated Guaranteed 5 per Cent. Stock.—Joule Memorial Fund.

£4,000 Southern Mahratta Railway 4 per Cent. Debenture Stock.—General Purposes.

£303 9*s.* 9*d.* on Deposit Account at Bank.—Brady Library Account.

£300 on Deposit Account on behalf of the Committee.—Joule Memorial Fund.

£1,000 Policy in the Atlas Assurance Office, becoming due October 7th, 1899.—Catalogue Account.

£1,000 Bond.—Dr. Gunning.—Interest to be applied to the promotion of Physics and Biology.

JOHN EVANS, *Treasurer*

Y 2

We, the Auditors of the Treasurer's Accounts on the part of the Council, have examined these Accounts and found them correct.

M. FOSTER.
W. T. BLANFORD.
F. D. GODMAN.

We, the Auditors of the Treasurer's Accounts on the part of the Society, have examined these Accounts and found them correct.

W. GRYLLS ADAMS.
ARTHUR W. RÜCKER.
W. C. WILLIAMSON.

Trust Funds. 1892.

Scientific Relief Fund.

£6,000 L. & N.W.R. 4 per Cent. Consolidated Guaranteed Stock.
£6,666 13*s.* 4*d.* Great Northern Railway 3 per Cent. Debenture Stock.
£4,340 South Eastern Railway 5 per Cent. Debenture Stock.

Dr

	£	s.	d.	£	s.	d.
To Balance { Income	970	1	8			
Capital	480	9	9			
				1,450	11	5
„ Dividends				640	11	6
„ Annual Subscription				5	0	0
„ Interest on Deposit				12	1	5
				£2,108	4	4

Cr.

	£	s.	d.	£	s.	d.
By Grants				575	0	0
„ Balance, Income	£1,047	14	7			
„ Capital	485	9	9	1,533	4	4
				£2,108	4	4

Donation Fund.

£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.
The Trevelyan Bequest. £1,861 6*s.* 8*d.* Great Northern Railway 3 per Cent. Debenture Stock.

	£	s.	d.
To Balance	876	14	11
„ Dividends	250	12	2
„ Transfer from Jodrell Fund	138	19	4
	£1,266	6	5

	£	s.	d.
By Grants	519	13	4
„ Balance	746	13	1
	£1,266	6	5

Rumford Fund.

£2,330 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	145	18	6	By Balance	208	8	2
„ Dividends	62	9	8				
	£208	8	2		£208	8	2

Bakerian and Copley Medal Fund.

Sir Joseph Copley's Gift, £1,666 13*s.* 4*d.* 2¾ per Cent. Consolidated Stock.
£403 9*s.* 8*d.* New 2½ per Cent. Stock.

	£	s.	d.		£	s.	d.
To Balance	111	0	6	By Gold Medal	4	12	0
Dividends, New 2½ per Cent. Stock	9	16	8	„ Bakerian Lecture, Professor James Thomson	4	0	0
Dividend—Sir J. Copley's Fund	44	13	4	„ Balance	156	18	6
	£165	10	6		£165	10	6

The Keck Bequest.

£800 Midland Railway 3 per Cent. Debenture Stock.

	£	s.	d.		£	s.	d.
To Dividends	23	8	0	By Payment to Foreign Secretary	23	8	0

Wintringham Fund.

£1,200 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	32	4	0	By Payment to Foundling Hospital	32	4	0
„ Dividends	32	4	0	„ Balance	32	4	0
	£64	8	0		£64	8	0

Croonian Lecture Fund.

One-fifth of the clear rent of an Estate at Lambeth Hill, from the College of Physicians, about £52 per annum.

	£ s. d.		£ s. d.
To Rent	Nil	By Lecture (1892)	Nil
	Nil		Nil

Davy Medal Fund.

£660 Madras Railway Guaranteed 5 per Cent. Stock.

	£ s. d.		£ s. d.
To Balance	74 12 1	By Gold Medals	32 8 9
,, Dividends	32 3 6	,, Balance	74 6 10
	£106 15 7		£106 15 7

The Gassiot Trust.

£10,000 Italian Irrigation Bonds.

£400 2¾ per Cent. Consolidated Stock.

	£ s. d.		£ s. d.
To Balance	62 16 6	By Payments to Kew Committee	487 10 0
,, Dividends	498 4 8	,, Purchase of £300 Italian Irrigation Bonds	334 18 0
,, Bonds drawn	352 1 7	,, Balance	90 14 9
	£913 2 9		£913 2 9

Handley Fund.

£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.

	£ s. d.		£ s. d.
To Dividends	187 2 4	By Transfer to Catalogue Account	187 2 4

The Jodrell Fund.

£5,182 14*s.* 10*d.* 2¾ per Cent. Consolidated Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Dividends	138	19	4	By Transfer to Donation Fund	138	19	4

Fee Reduction Fund.

£4,400 Metropolitan 3½ per Cent. Stock.
£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	204	15	1	By Transfer to Royal Society General Account	320	0	0
„ Dividends	423	3	0	„ Balance	307	18	1
	£627	18	1		£627	18	1

Darwin Memorial Fund.

£2,200 South Eastern Railway 4 per Cent. Debenture Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	293	18	0	By Balance	379	14	0
„ Dividends	85	16	0				
	£379	14	0		£379	14	0

Joule Memorial Fund.

£800 London, Brighton, and South Coast Railway Consolidated Guaranteed 5 per Cent. Stock.
£300 on Deposit on behalf of the Committee.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	203	11	11	By Tablet and Abbey Fees	181	3	4
„ Interest on Deposit	3	12	2	„ Balance	65	0	9
„ Dividend	39	0	0				
	£246	4	1		£246	4	1

Brady Library Fund.

£303 9*s.* 9*d.* on Deposit Account at Bank.

	£	*s.*	*d.*		£	*s.*	*d.*
To Amount on Deposit at Bank	300	0	0	By Balance on Deposit	303	9	9
,, Interest thereon	3	9	9				
	£303	9	9		£303	9	9

Gunning Fund.

£1,000 4 per Cent. Bond of His Excellency Dr. Gunning.

	£	*s.*	*d.*		£	*s.*	*d.*
To Interest	40	0	0	By Balance	40	0	0

The following Table shows the progress and present state of the Society with respect to the number of Fellows :—

	Patron and Royal.	Foreign.	Compounders.	£4 yearly.	£3 yearly.	Total.
Nov. 30, 1891 ..	5	46	166	138	161	516
Since Elected ..			+ 3	+ 2	+12	+17
Since Deceased ..	−1	−4	−14	−13	− 2	−34
Since Compounded			+ 1		− 1	
Nov. 30, 1892 ..	4	42	156	127	170	499

Account of Grants from the Donation Fund in 1891–92.

	£	*s.*	*d.*
Dr. Woodward, to aid Dr. Hinde in illustrating his Memoir on Sponge Remains from the Lower Tertiary Strata of Oamaru, N.Z.	40	0	0
F. C. Penrose, for aid in Researches "on the Orientation of ancient Greek Temples"	100	0	0
Prof. W. N. Parker, for the completion of Researches on *Protopterus*	54	9	4
E. H. Griffiths, for Investigations into the Changes in the Specific Heat of Water, and the Determination of the Value of J	100	0	0
Dr. H. Gadow, for Investigations into the Anatomy of Elasmobranch Fishes	50	0	0
Prof. Schäfer, to aid Dr. Haycraft in Researches on the Intimate Nature of Secretion	30	0	0
Col. Godwin-Austen, to aid Mr. W. Doherty in the Collection of Land Mollusca in the Malay Archipelago ..	30	0	0
W. T. Thiselton Dyer, for obtaining Botanical Collections in an Expedition to Kilima-Njaro	50	0	0
Mountain Observatory Committee, for completing telescope	80	0	0
	£534	9	4
Repayments	14	16	0
	£519	13	4